

SemGeo - A Bridge Between GIS And Semantic Web Based Solutions

Marek Strzelecki, Tomasz Kubik*

* Wrocław University of Environmental and Life Sciences, Institute of Geodesy and Geoinformatics - Wrocław, Poland

Abstract. Without losing generality it can be said that the search for information is a process of generating answers to five basic questions: “Who?”, “What?”, “Where?”, “When?”, “Why?”. What is more, each of these questions relates to different domain, but together they create a context, without which the generated answers would remain incomplete or even useless. Due to variety of levels on which the search is conducted, it is not an easy task to find the relevant data, analyse it and process it into information. It requires the use of complex data exchange and inference methods.

For years, people have been trying to manage collected data and process it automatically. However, we encounter many difficulties in integrating data of different nature. One thing is to analyse text, it is another thing to analyse spatial data. In each of these areas different methods and tools are used.

Recently a lot of attention has been drawn to the methods of creating and processing Internet resources. To facilitate computer analysis of these resources, the use of Semantic Web technologies began. These technologies provide methods to represent and create structural data, that can serve as metadata or knowledge base. These methods are suitable for semantic description of facts and for generating answers to questions “Who?”, “What?”, “Why?” with the use of logics and inference engines. It is a bit more difficult to use them to describe facts that answer questions “Where?” and “When?”. A major challenge in particular is the semantic description and analysis (with inference) of spatial data. Spatial analysis are performed well in GIS. However, these systems analysis methods are based on arithmetic calculations, not logic and inference systems. Therefore, it is difficult to integrate

them with other semantically described resources or those exposing structured data.

Poster presents a solution built to create a bridge between GIS and solutions supporting Semantic Web technologies.

It covers the analysis of possibilities of implementing geospatial services with the use of Semantic Web technologies, as well as evaluation and comparison of two spatial ontologies based on different approaches – NeoGeo Ontology and GeoSPARQL. Presentation mainly focuses on authors' tool called "SemGeo" which is a bridge between spatial database and knowledge base. SemGeo is using NeoGeo ontologies to semantically represent spatial data. In first step spatial data is semantically indexed - unique identifiers URI are generated for all spatial features from selected PostGIS database. Semantic annotation is then performed on both geometry and topological relations between features. Geometry is described with NeoGeo Geometry ontology. Extracted features are spatially analyzed to produce topological relations between other features from selected schema. Features and their relations are annotated with NeoGeo Spatial ontology which is based on RCC8 calculus. Both geometry and feature descriptions are available in RDF/XML notation by URI dereference. SemGeo can also generate semantic topological description for selected area restricted by bounding box. This description can be loaded into knowledge base and used by inference engine. SemGeo provides standard SPARQL HTTP interface where SPARQL queries can be executed. Queries can be enriched with topological functions from NeoGeo Spatial ontology. SemGeo integrates semantic and spatial data in shared RDF Repository which can be supplemented with RDF/XML data from other sources. Authors also conducted evaluation and comparison of created tool to similar solution – IndexingSail, which is based on GeoSPARQL ontology. Poster presents potential applications of created tool. It also evaluates chances of Semantic Web technologies usage in geospatial web services.

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